



Long-term effects of a snow-pack model on Greenland melt

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Meltwater from Greenland is expected to increase within the next centuries thereby affecting global sea level rise. However, the timing and magnitude of the Greenland melt remains rather unclear because of the different processes involved. During the ablation season, for example, meltwater can refreeze within the snow pack. Aging of snow and snow densification are other processes that need to be considered for future Greenland melt projections. Models that include these physical processes have been widely used for avalanche forecasts. These so-called snow-pack models are also included in Regional Climate Models (RCMs) which have been applied to the Greenland ice sheet. However, RCMs are computationally too expensive to resolve the dynamics of ice sheets on centennial to multi-millennial time scales.

We present a setup for the Greenland melt on longer time scales using a snow-pack model based on surface mass and energy balance considerations. We compare our approach to simple melt parametrizations like the positive-degree-day approach or the insolation-temperature melt method to quantify the long-term effect on Greenland melt.